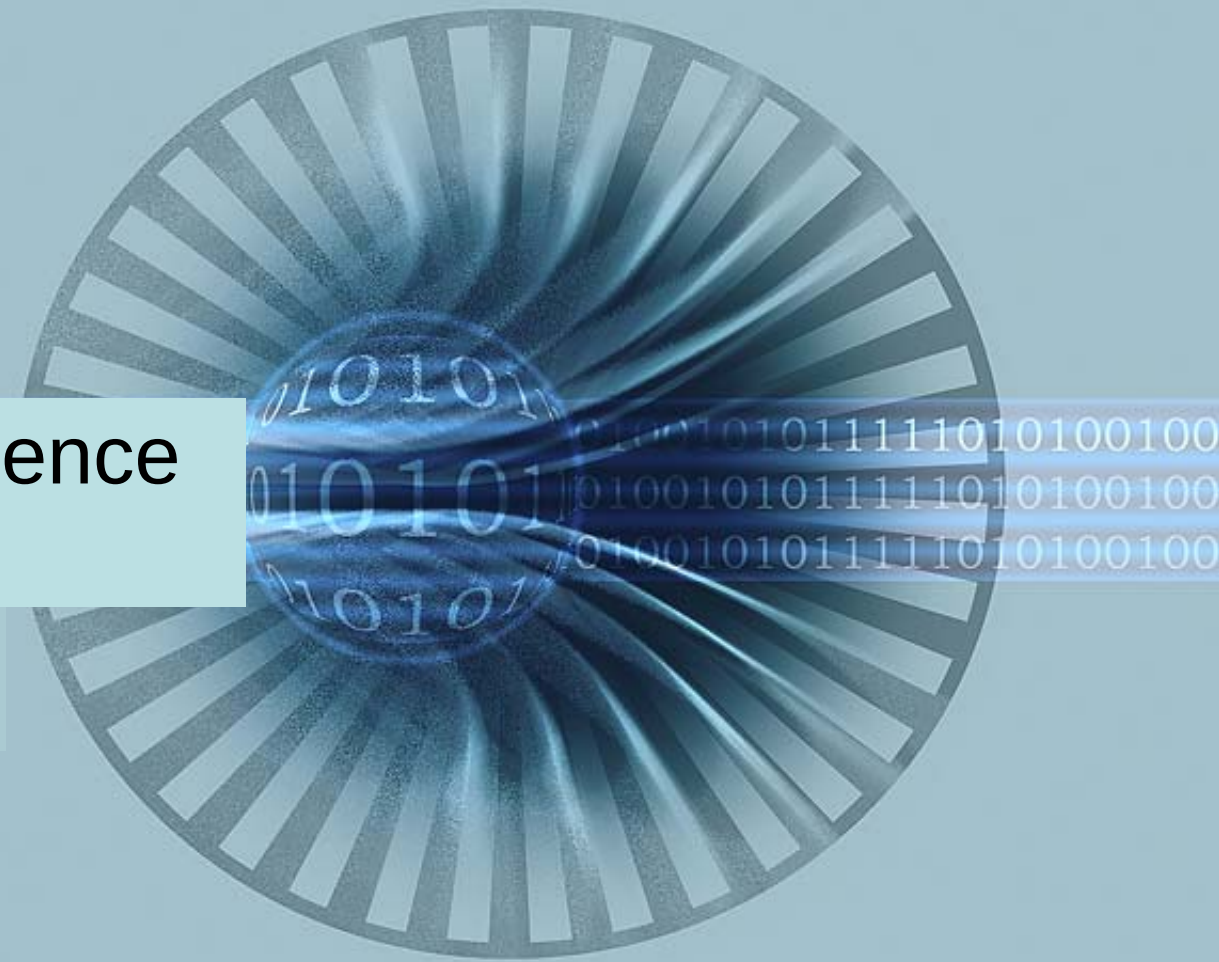
Iowa Math and Science Education Summit

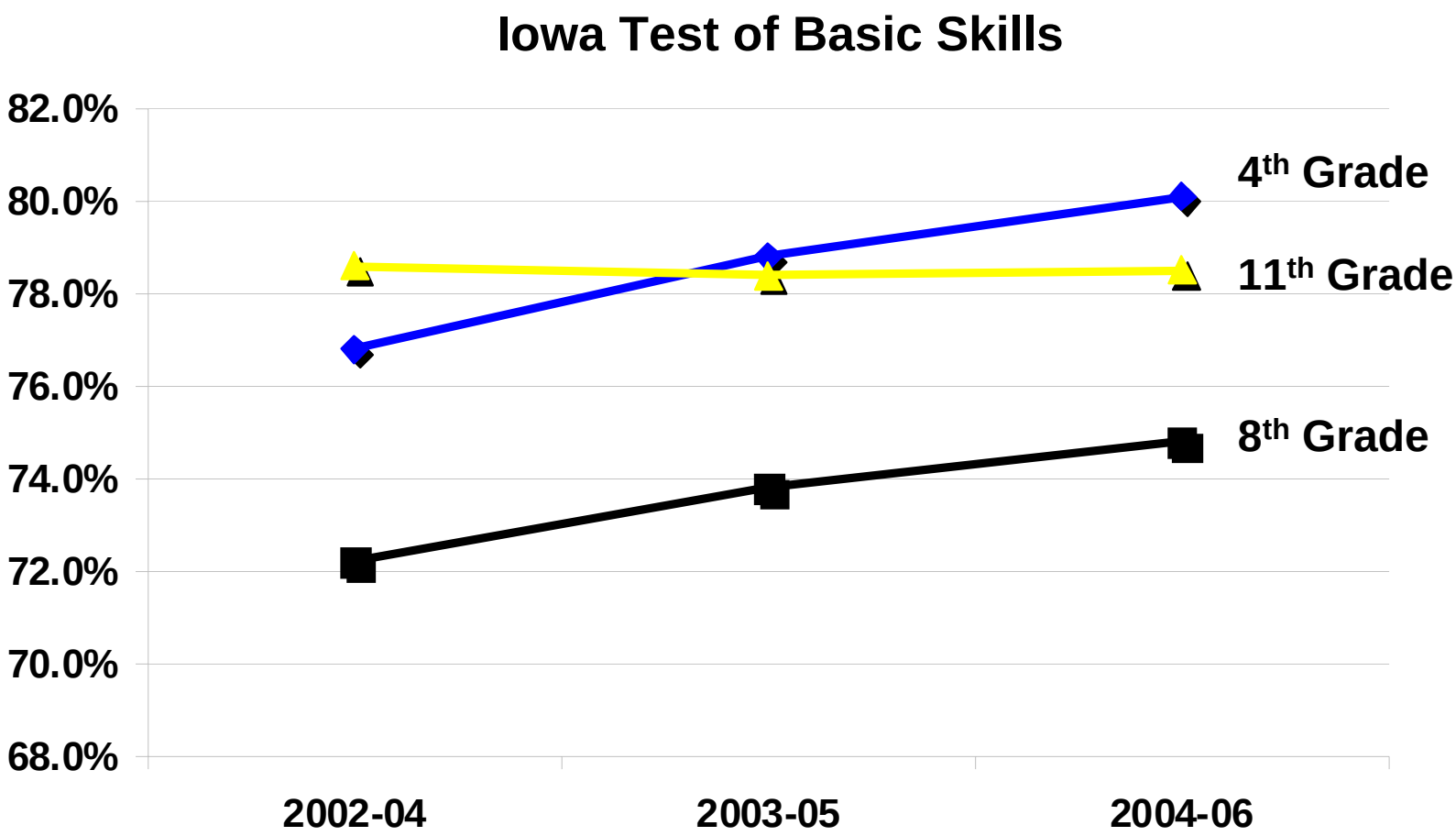
July 11, 2007



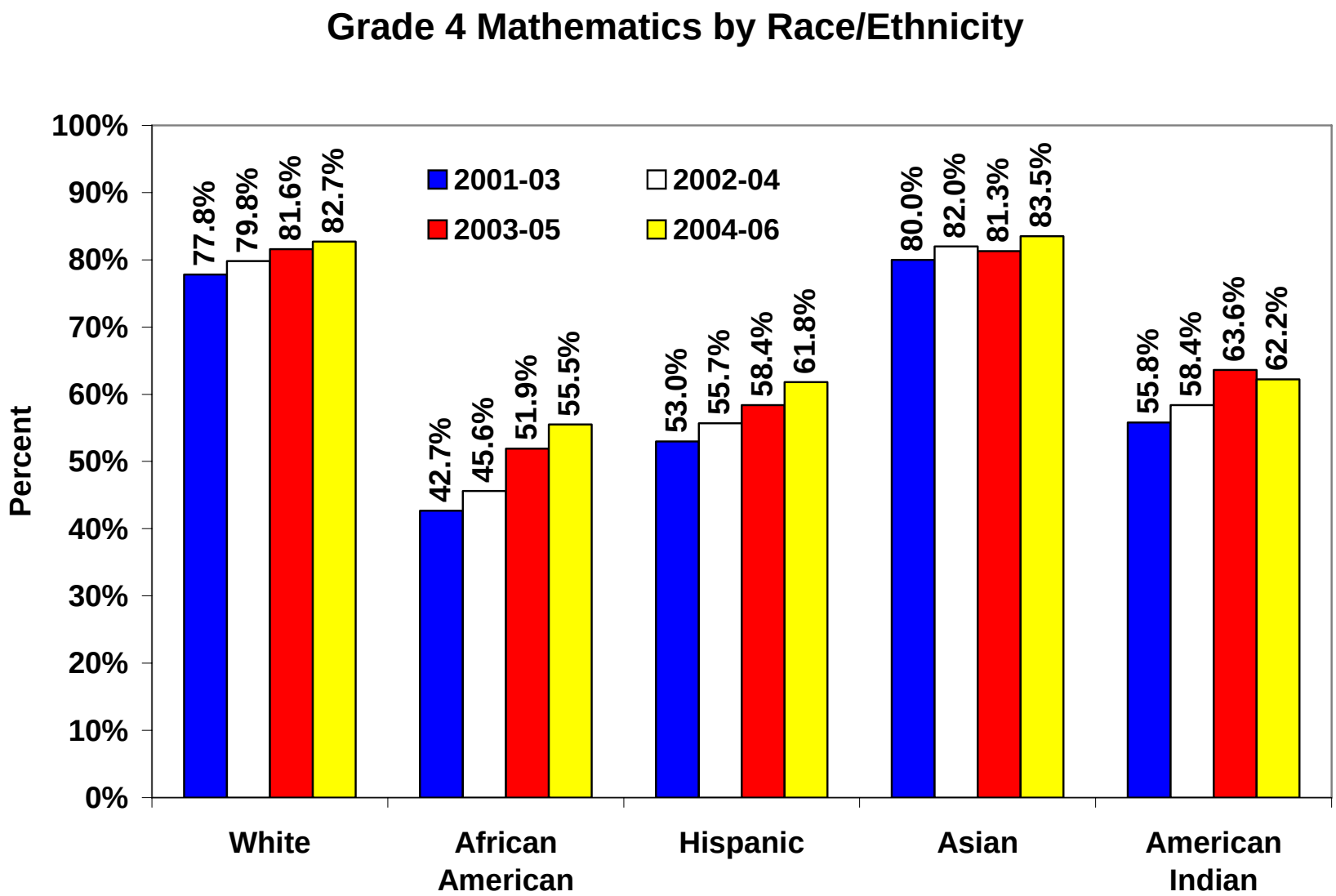
Math and Science Education in Iowa

- Performance of Iowa Students
- Teachers and Curriculum
- Statewide Initiatives and Collaboration

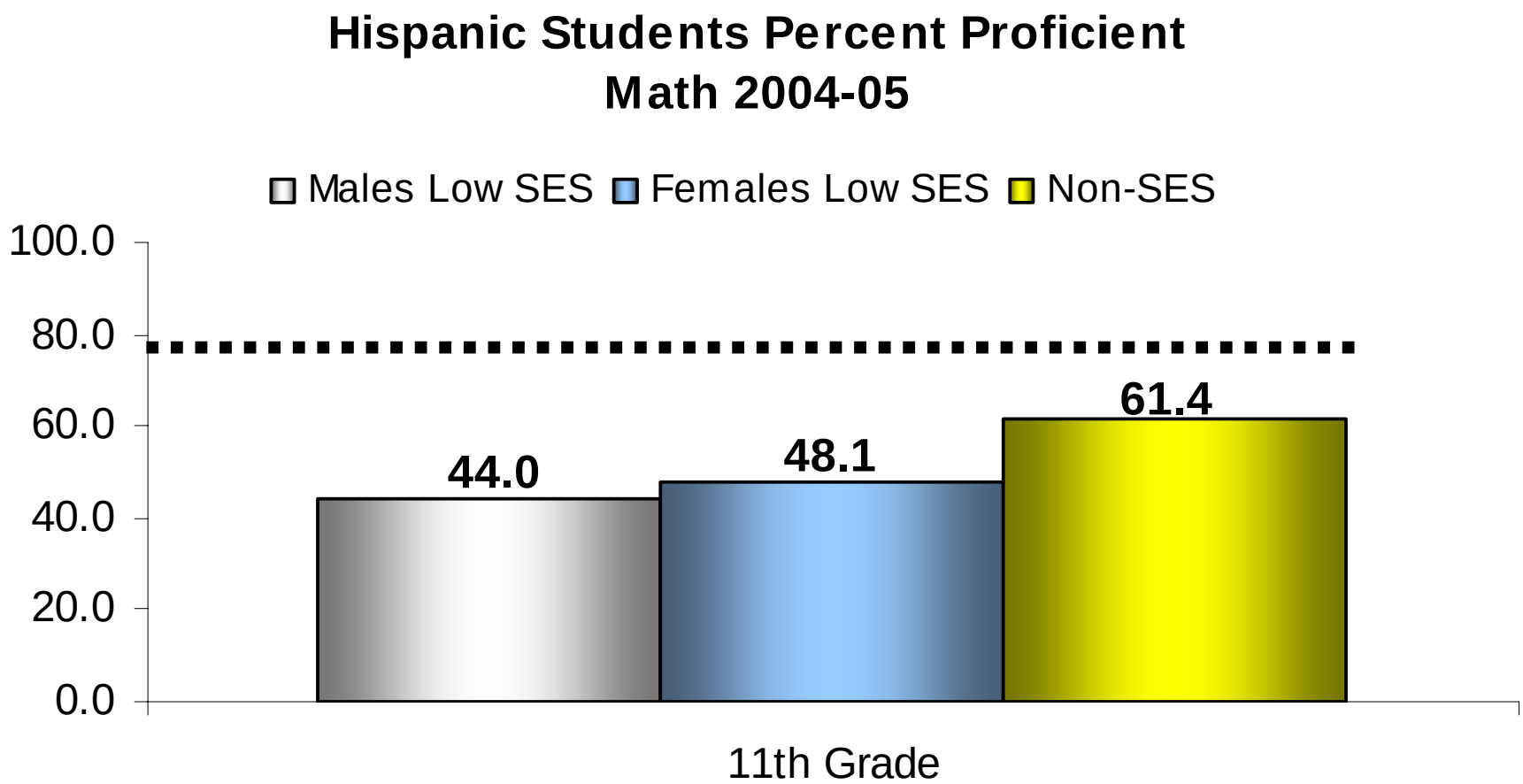
Math Trends


Iowa Test of Basic Skills
82.0%
80.0%
78.0%
76.0%
74.0%
72.0%
70.0%
68.0%
2002-04
2003-05
2004-06
4th Grade
11th Grade
8th Grade

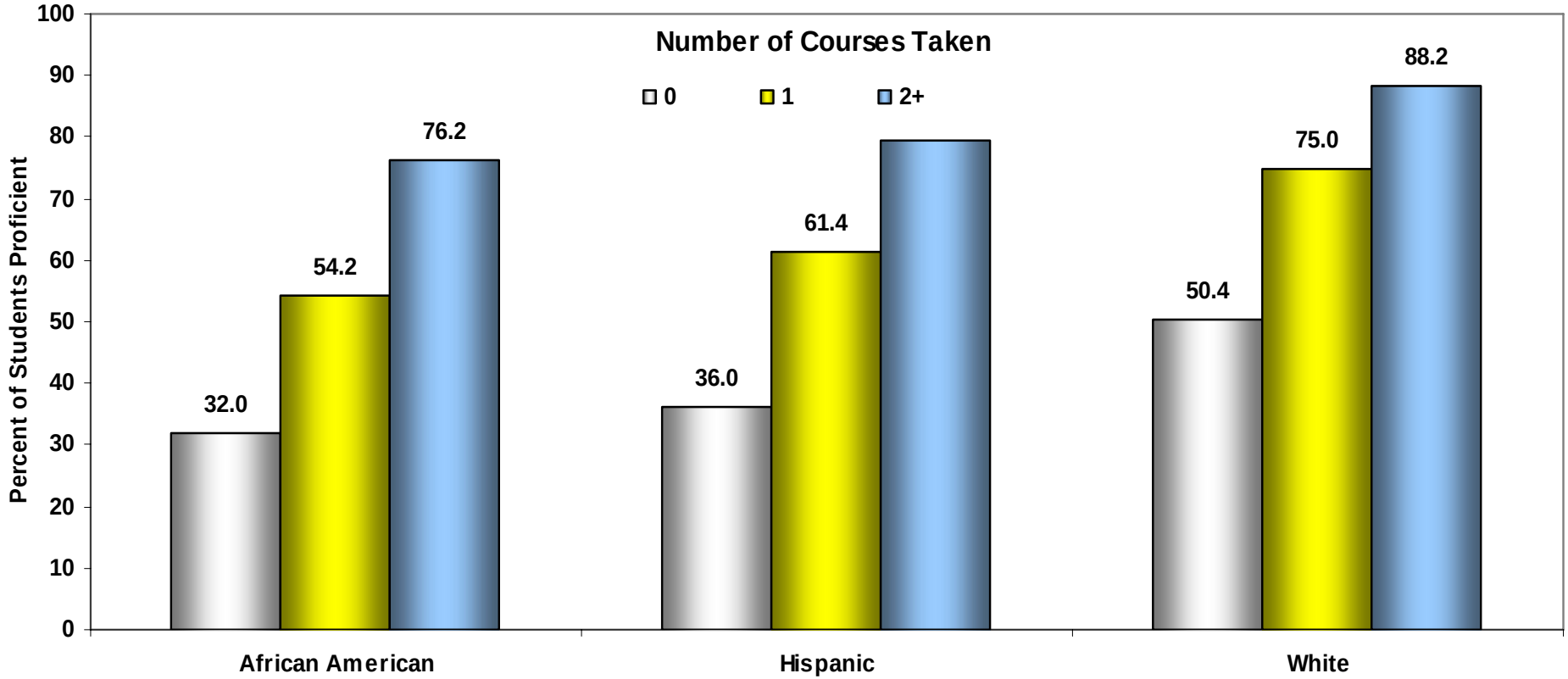
Achievement Gaps



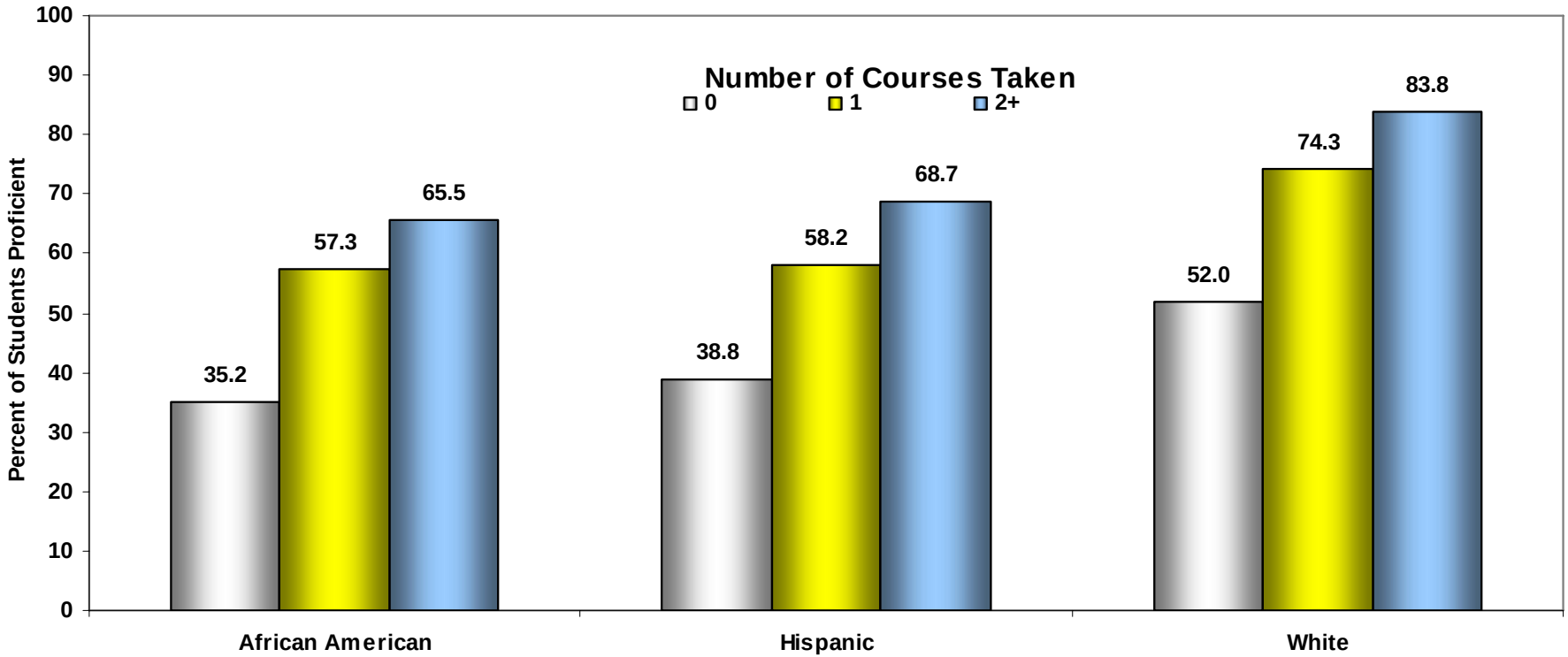
Combination of Factors



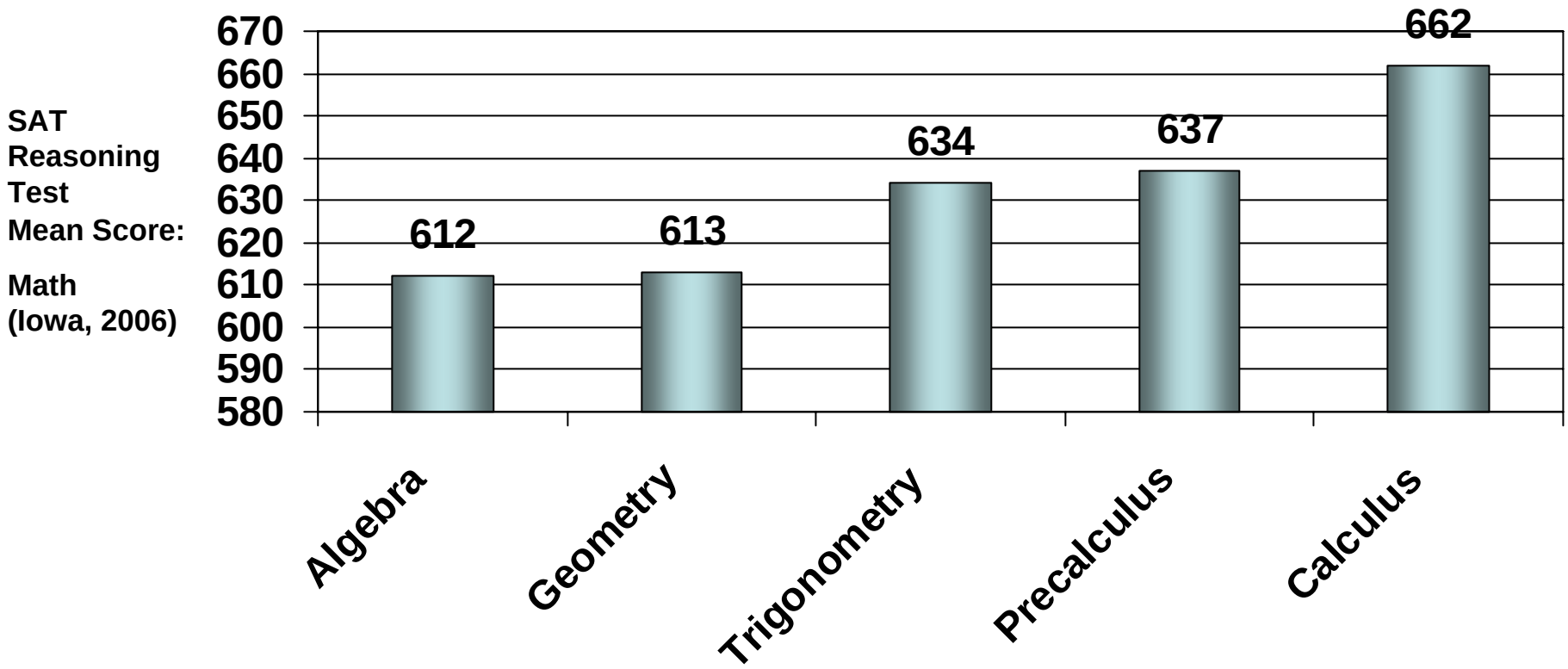
Percent of Students Proficient on ITED vs. Number of Higher Level Courses Taken - *Math*



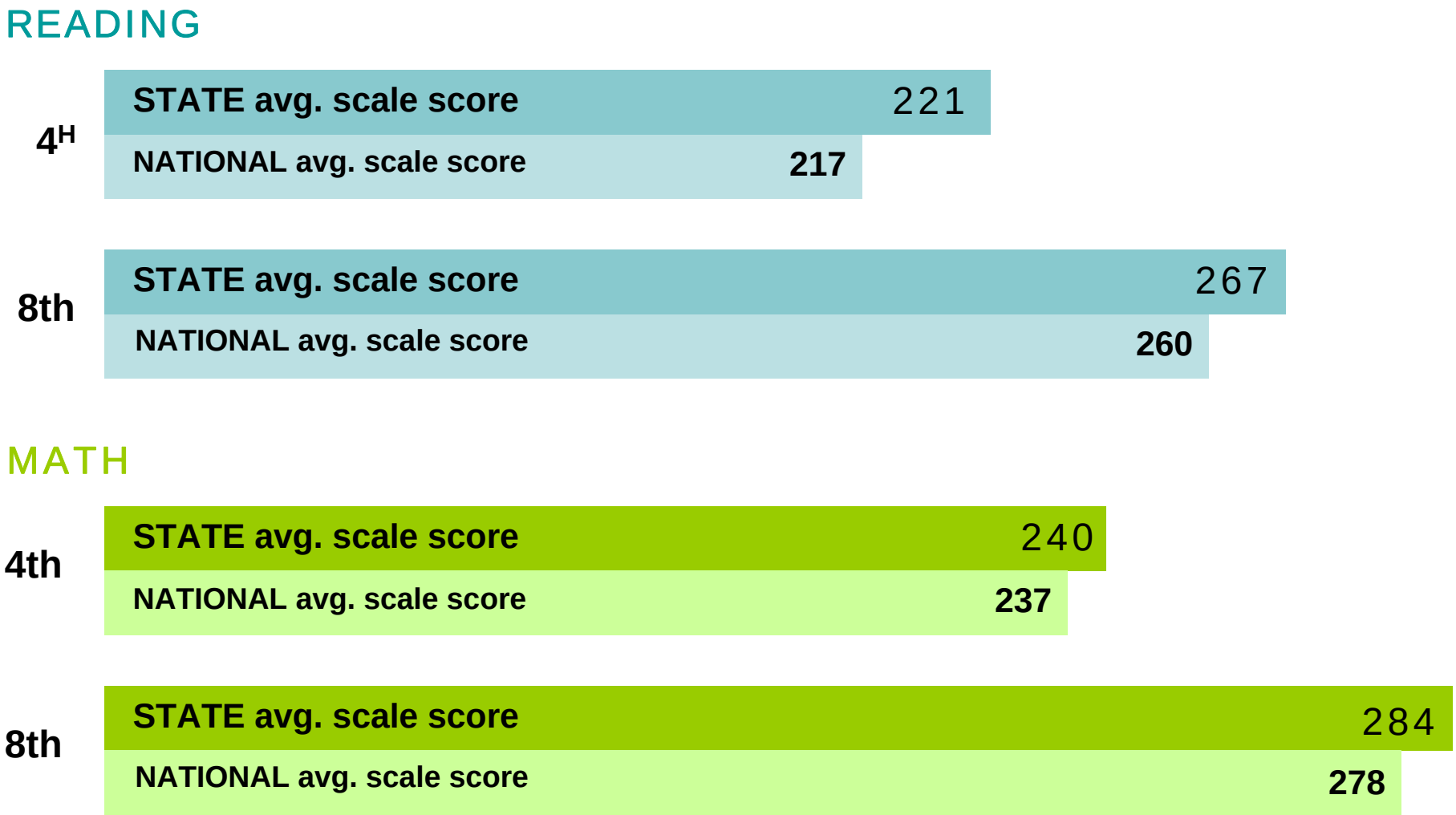
Percent of Students Proficient on ITED vs. Number of Higher Level Courses Taken - *Science*



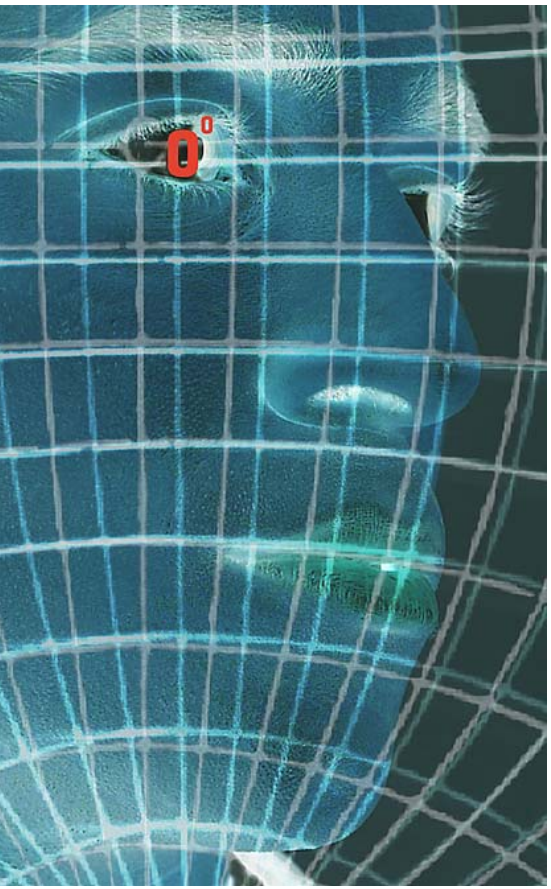
A Rigorous Math Curriculum Improves SAT Achievement



National Assessment
of Educational Progress (NAEP) 2005



What are Some Causes?



- 21.5% not reading at grade level (45% African Americans / 42% Hispanic)
- 40% of all math errors on state tests are reading errors…
- 60% of reading questions on ITBS are inferential…
- There is no 6th grade math test…it's cumulative; it is a 6, 5, 4, 3, 2, 1 test

NAEP Scores

Grade 8 Iowa Mathematics Scores (2005)

Math Classes Currently Taking (2005)	White Student Average Score	White Percentage Taking Class	African-American Average Score	African-American Percent Taking Class
Algebra or Geometry	306	26%	264	23%
Pre-algebra or General Math	280	74%	254	77%

Basic - 262-298

Proficient - 299-332

Advanced - 333 and above

Math and Science Performance
Challenges

- Closing achievement gaps in math and science
- Improving achievement at high school level
- Ensuring a strong pathway (courses) for math/science

But what about teachers and curriculum….

High-Quality Mathematics and Science Teachers …

Most effective teachers are producing not just a little more growth, but as many as **six times** *the learning gains* produced by least effective teachers.

… Are Important …

These effects accumulate over the grade levels, with initially similar-achieving students separated by as many as 50 percentile points three years later based solely on the quality of the teachers they were assigned to.

Because…

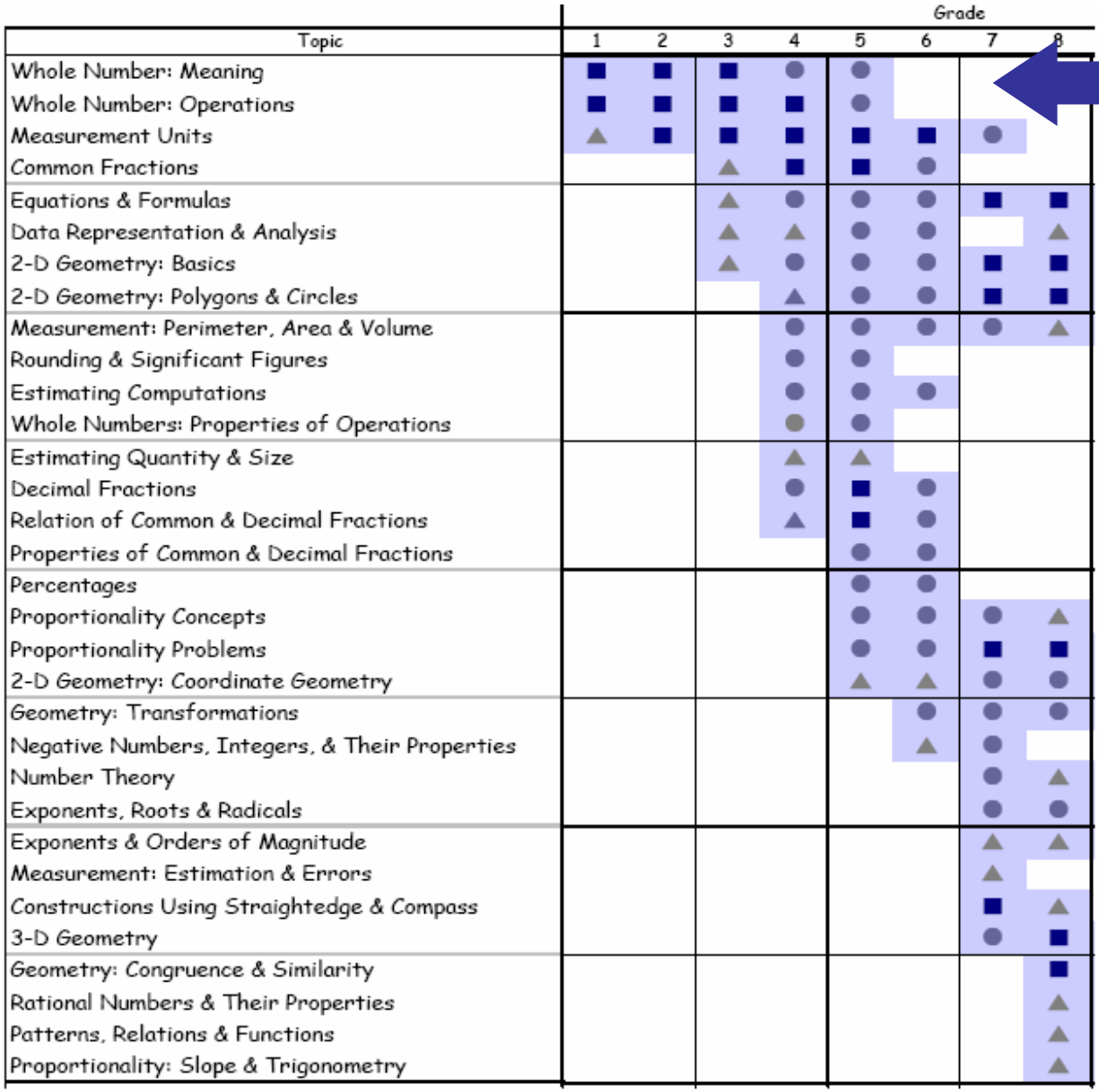
Most importantly, these differences are not explained by differences in the race, socioeconomic, or prior achievement of the students, but, mainly by the differences in *the quality of the teachers*.

What is High Quality Instruction?

Weiss and Pasley, *EL*

- Mathematics and science content that is:
  - Significant and worthwhile
  - At an appropriate developmental level
  - Accurate
  - Paced appropriately
  - Rigorous
- Students interacting purposefully and deeply with the content
- Adjusting instruction to the student's level of understanding
- Using effective questioning that helps students make connections
- Encouraging and valuing active student participation

Math Curriculum from Top Achieving Counties



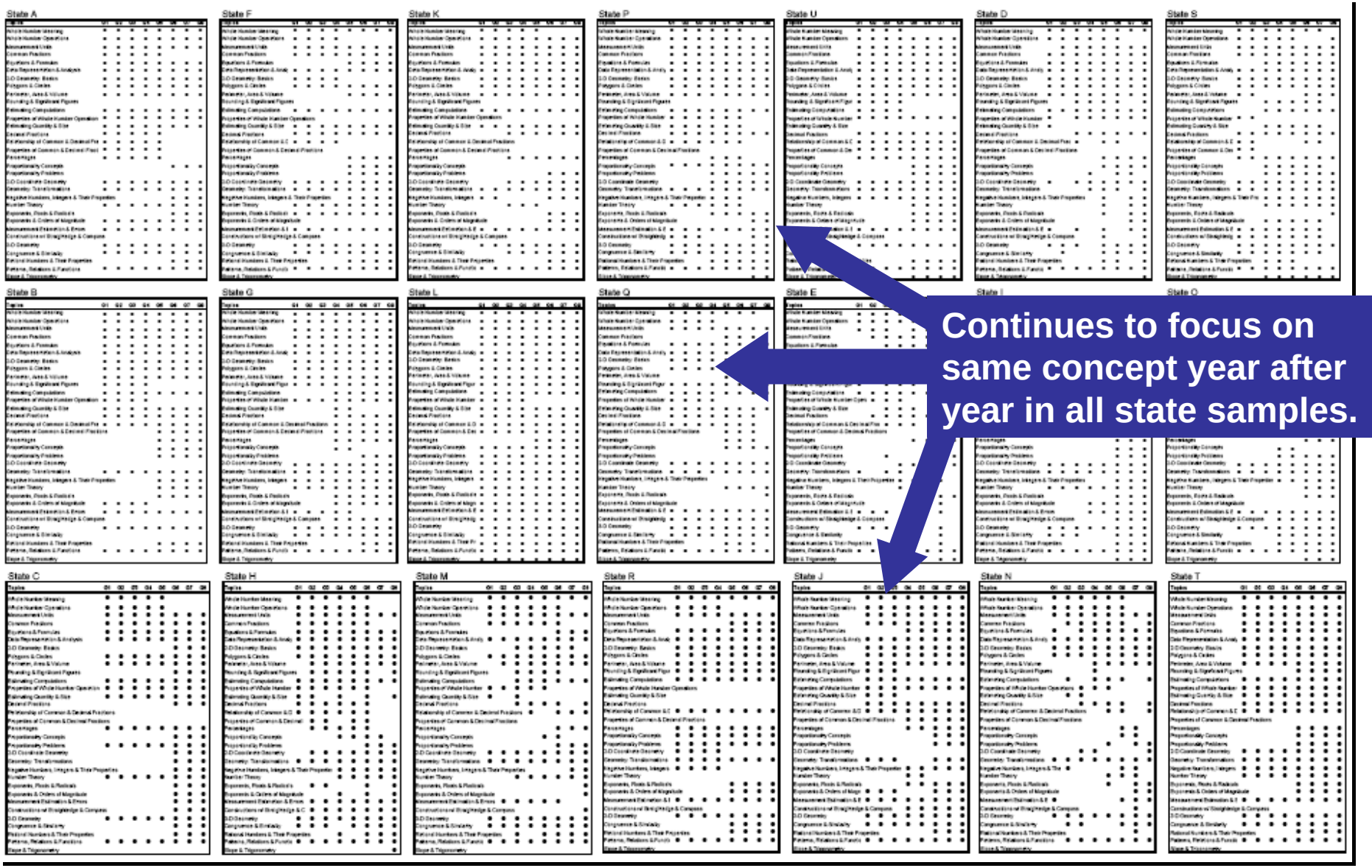
Provides depth, then moves on to new concept

▲ Intended by 4 out of the 6 top-achieving countries

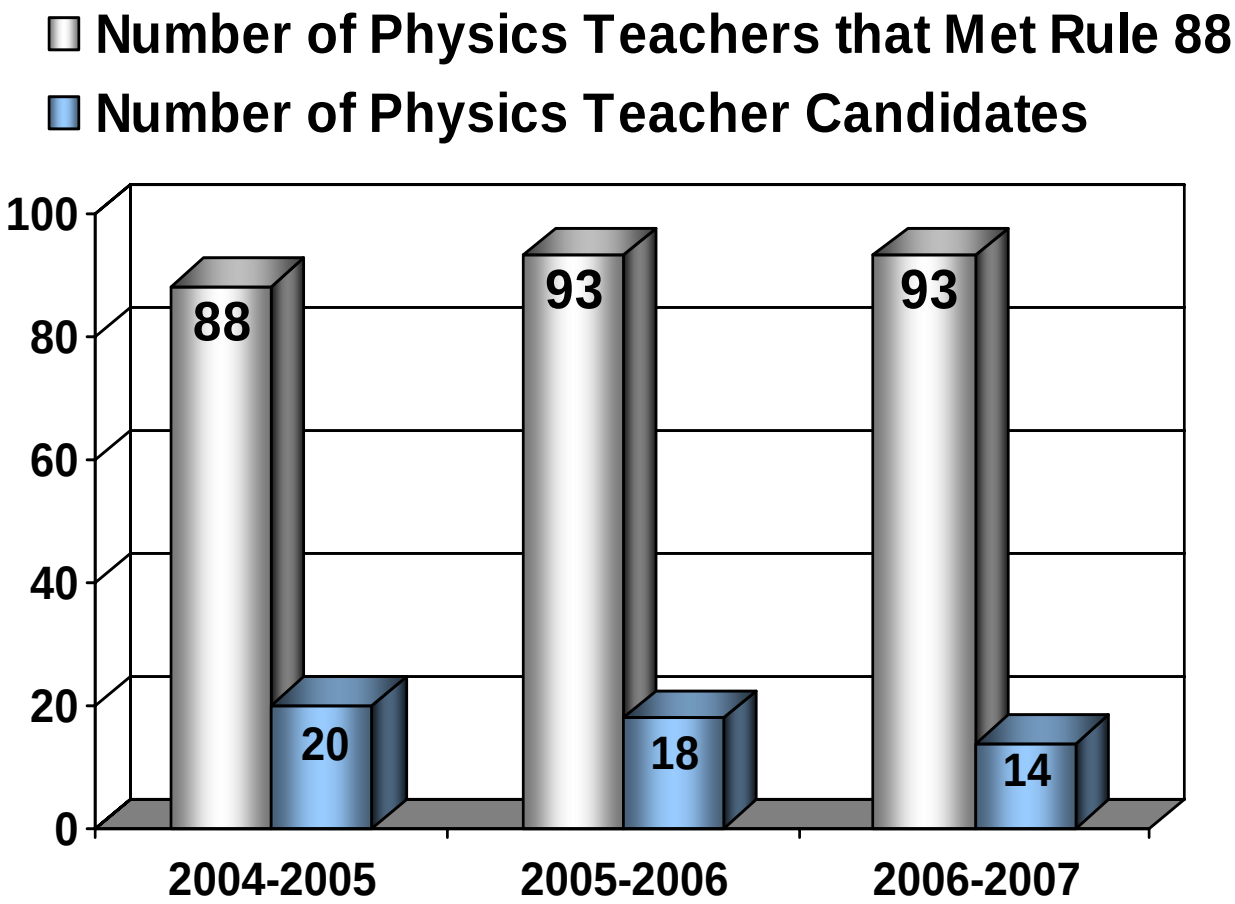
● Intended by all but *one* of the top-achieving countries (5 out of 6).

■ Intended by *all* of the top-achieving countries.

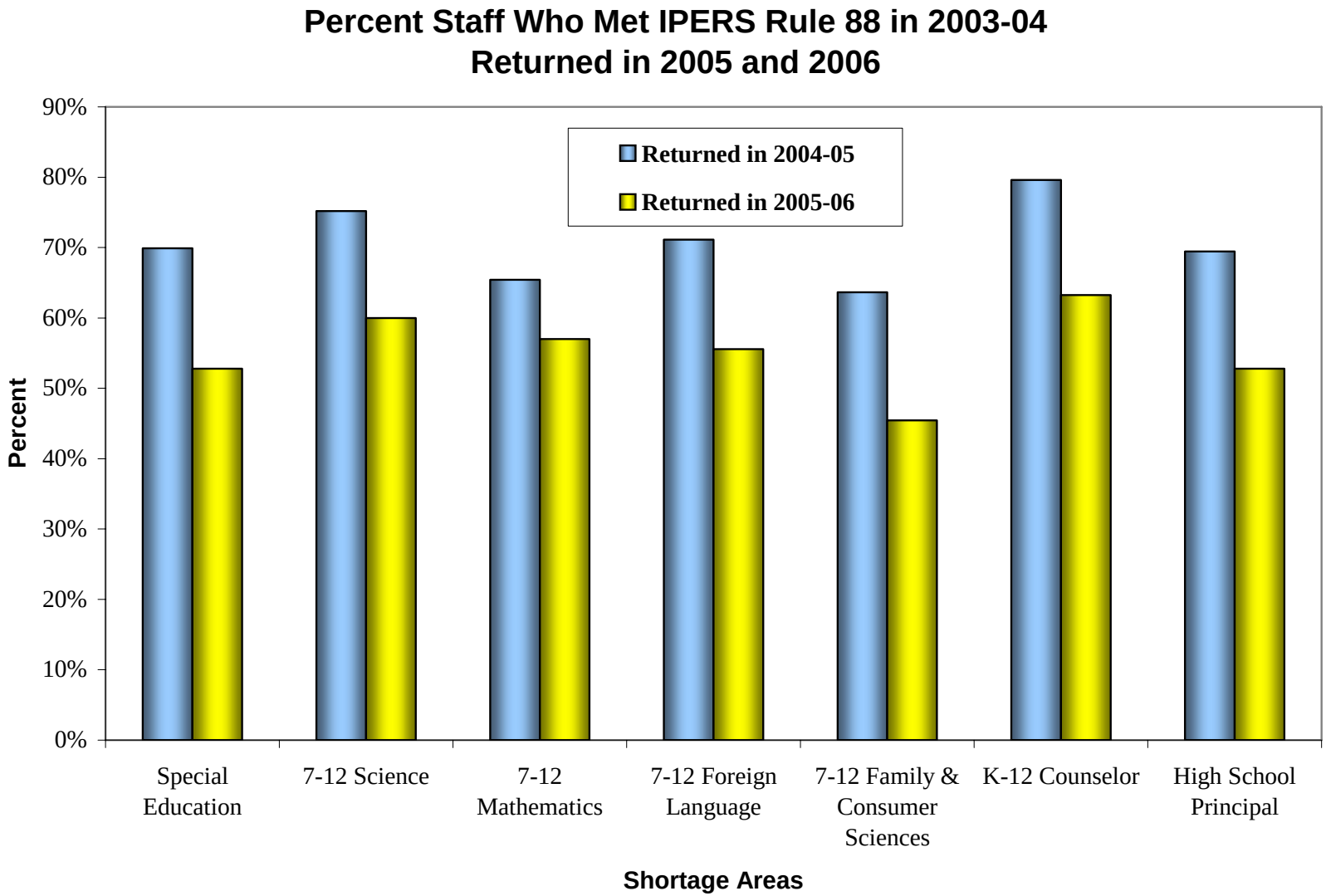
Math Standards from Sample State



Looming Shortages

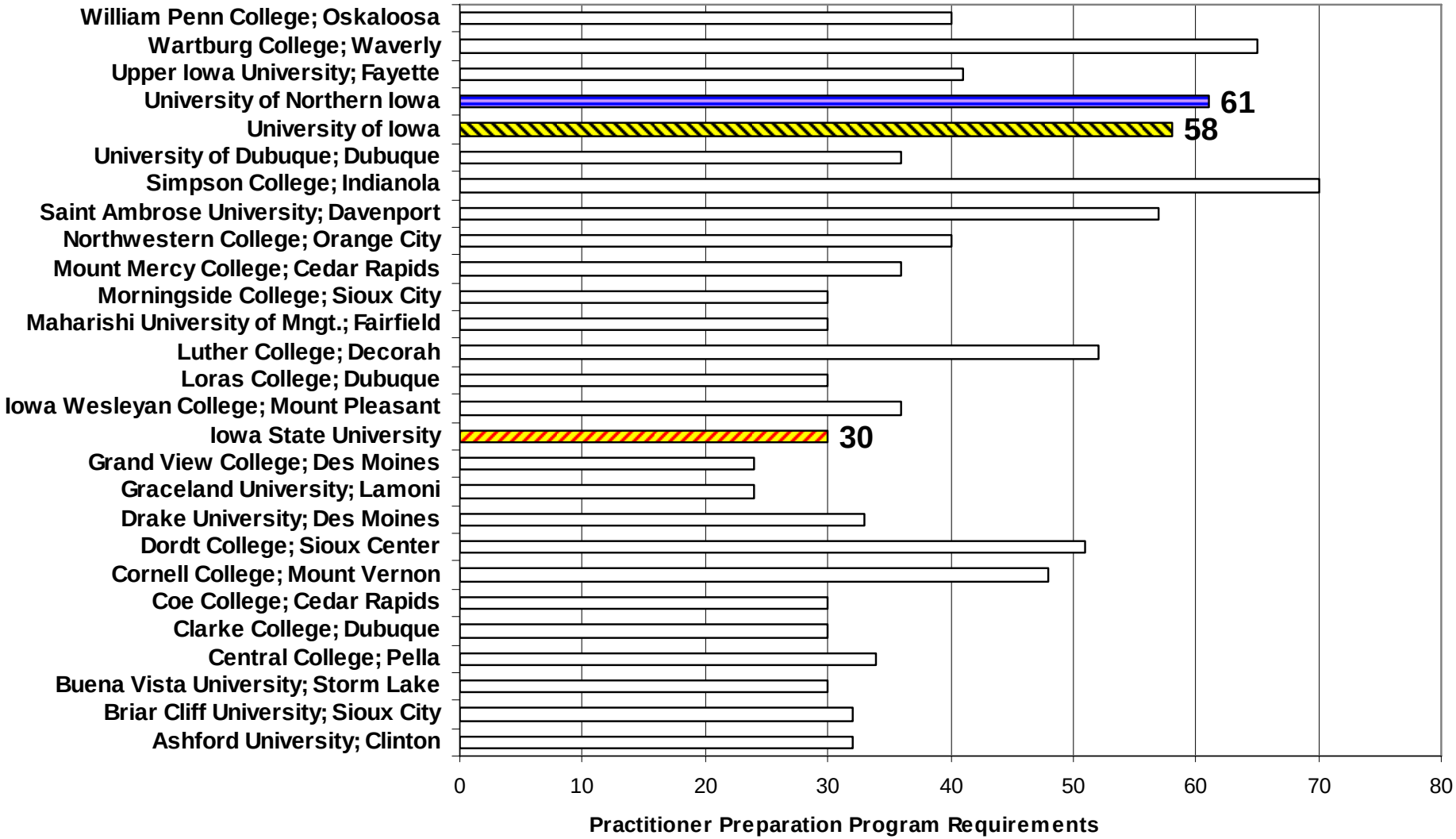


Teachers Retiring



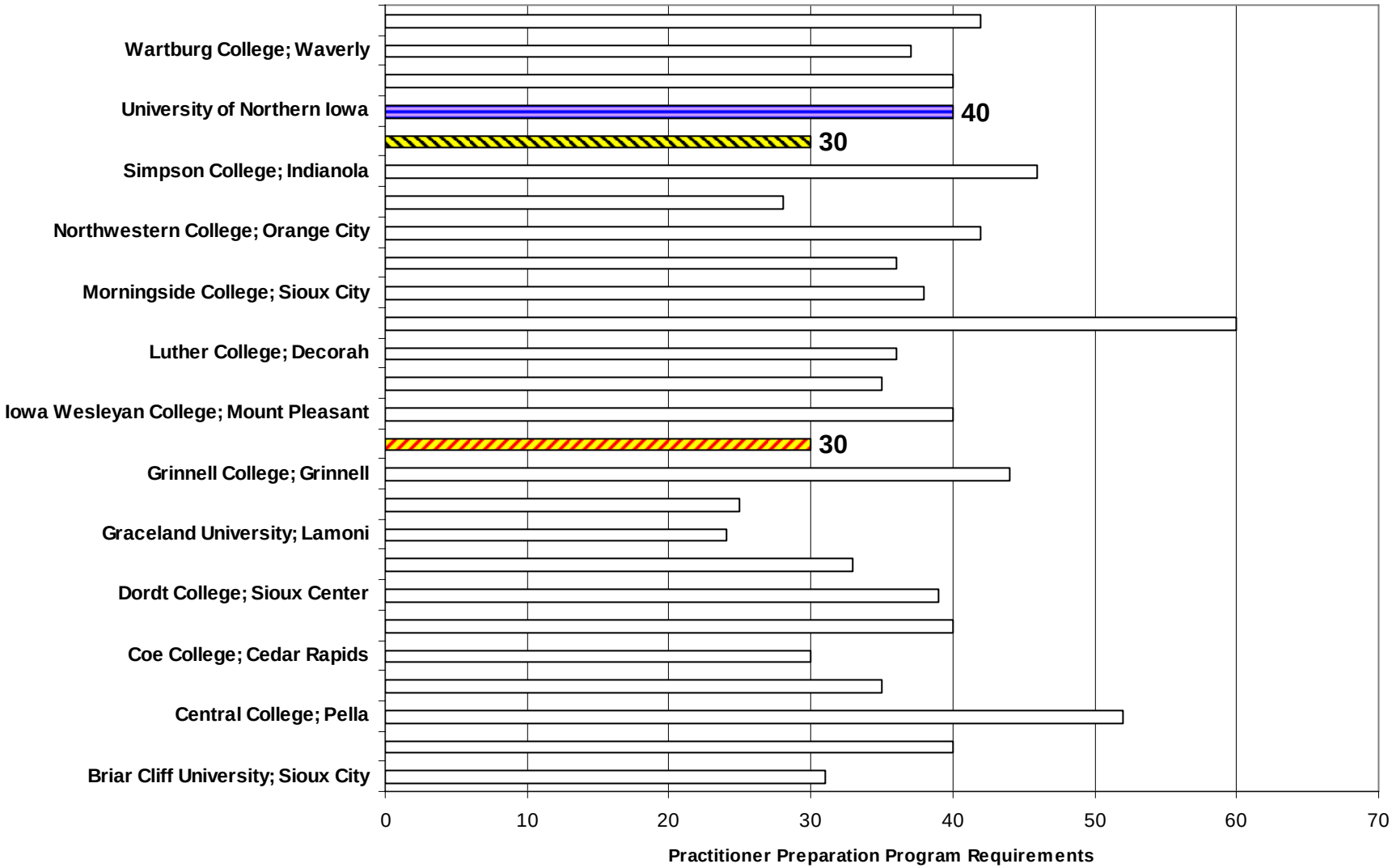
Grades 7-12 Science

(BOEE Requirements – **24**)



Grades 7-12 Math

(BOEE Requirements – **24**)



Teachers & Curriculum
Challenges

- Examining current practices in curriculum
- Retaining practicing teachers
- Increasing the number of middle and high school math and science teachers
- Examining university requirements for math/science endorsements and elementary teachers

Statewide Collaboration and Coordination

- ***Every Child Reads***
  - Expand the capacity of early care and education systems to use language, reading, and writing strategies to enhance the literacy development of children ages 3 to 5 and continuing to assist teachers with research-based strategies for students in grades K-12.
- ***Every Student Counts***
  - Improve achievement of K-12 students in mathematics
  - Build learning communities engaged in the study of mathematics, mathematics instruction, and student achievement in mathematics through effective implementation of Iowa's Professional Development Model.
- ***Every Learner Inquires***
  - Assist Iowa's AEAs, schools, and districts in building the capacity to implement an effective K-12 science education program using inquiry-based instructional strategies as outlined in the *National Science Education Standards.*
- ***Model Core Curriculum***
  - Provides curriculum in the areas of English/language arts, math, and science that school districts may reference in developing their local curriculum.

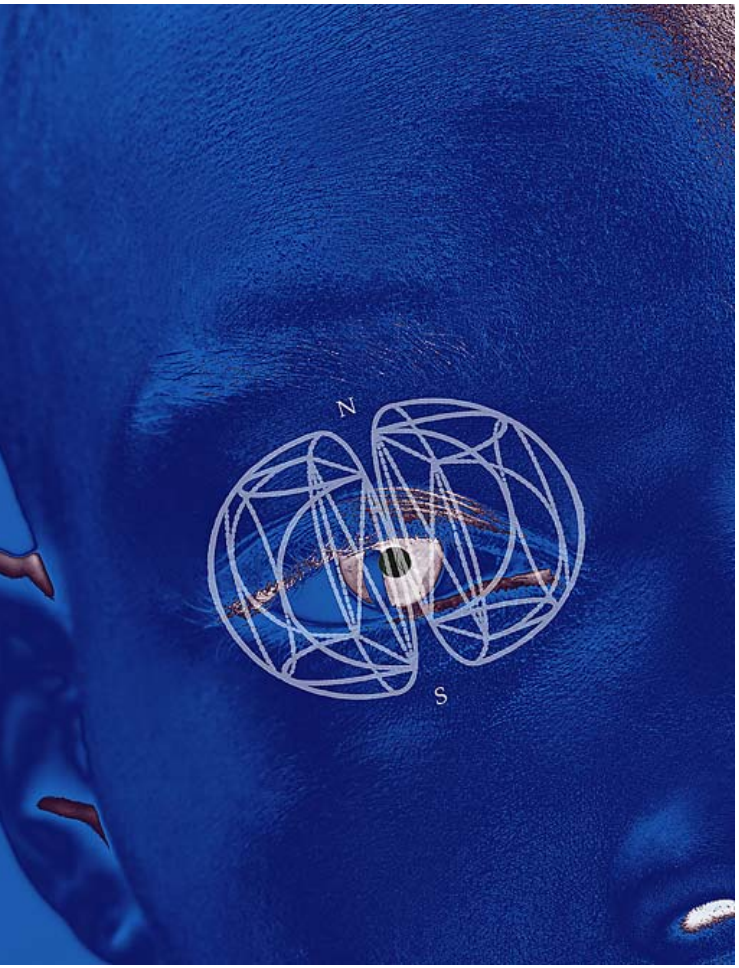
Student Opportunity by School Size

2006-07		**Enrollment Category**				
	Required Units	<400	400+	<1000	1000+	State
English/Language Arts	6	7.3	7.6	7.9	10.3	8.5
Mathematics	6	7.6	7.7	8.4	9.8	8.6
Science	5	6.2	6.1	6.5	8.3	7
Social studies	5	5.8	5.7	5.9	7.5	6.4
Foreign Language	4	4	4.2	4.3	7.8	5.4

Science and Mathematics Teacher Imperative Commission

- National initiative to stimulate preparation, induction, and professional development sponsored by National Association of State Universities and Land-Grant Colleges (NASULGC)
- Critical barrier to improving achievement is shortage of qualified teachers
- Major objective – increase the number!!!
  - Establish state and institutional goals
  - Analyze current initiatives by universities
  - Assess success of model programs

Challenges



- Provision of on-going in-depth professional development for all practicing teachers
- Ensuring all students have access to rigorous and high-quality coursework regardless of geography
- Establish state goals to address the teacher imperative

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